

Published as *Melospiza socialis* HAN and 1944 Tyne, C. I. no. 201/1394
 Mink Canyon Fossils & Other Species

	(a) br dist end	(b) length tooth 1	(c) ht tooth 1	(d) br tooth 2	(e) depth tooth 2	(f) br ant. of tooth 3	(g) length tooth 3	(h) ht of dist. tooth	(i) br across ant. post. of tooth	length tooth to dist. tooth 4a	wt length 1 cb	br to dist da	br to depth 2 de	depth 3 to dist ga	wt tooth 1 hc	bi	di	gi	hi
Mink Canyon	17.5	10.4	10.2	5.0	8.2	4.6	10.8	8.5	16.0		98.2	28.5	61.0	61.7	83.3	65.1	31.2	67.4	53.2
<i>Spilornis</i> 1278	14.1	7.9	6.4	4.0	5.8	3.0	7.5	7.0	12.4		81.0		64.9	53.2	109.2	63.7	32.2		56.3
<i>B. regalis</i> 839	18.1	10.3	8.4	4.9	7.0	3.2	8.8	8.9	15.0		81.6		70.0	48.6	106.0	68.7	32.6		59.4
1091	18.5	10.7	8.9	5.1	7.3	3.5	9.3	10.0	15.4		83.2		69.8	50.3	89.0	69.5	33.1		65.0
<i>B. borealis</i> 536	15.0	8.6	7.3	4.4	6.6	2.8	7.7	8.3	12.5		84.7		66.6	51.3	113.8	68.7	35.2		66.4
" 829	16.3	9.4	8.3	4.8	7.1	2.8	9.1	9.2	13.8		86.4		67.7	55.6	116.9	69.6	34.8		70.2
678	12.2	7.0	6.3	4.0	5.3	2.1	6.0	7.1	10.4		90.0		85.4	54.1	112.6	67.3	38.5		68.4
<i>Spizocoris</i> 16929	20.2	11.6	10.0	5.8	8.2	3.7	10.2	9.4	16.6		86.4		70.8	50.6	94.0	70.0	34.9		56.6
" 16872	20.1	11.3	10.3	6.1	9.3	3.6	10.7	9.5	16.8		91.3		65.6	53.3	92.3	69.0	37.1		57.9
<i>S. tyrannus</i>	16.7	9.6	8.0	4.7	6.7	3.2	9.1	7.3	13.9		83.3		70.2	54.4	91.3	69.1	33.8		52.5
<i>Oranthea</i> 1297	14.5	8.0	6.7	4.1	5.6	3.1	6.9	7.4	13.0		83.7	28.2	23.3	47.6	110.2	61.5	31.5		56.8
<i>Protonotus</i> 1836	13.5	7.8	7.2	4.0	5.8	2.2	7.2	7.5	11.5		92.3		69.1	53.3	104.1	67.9	34.8		65.2
<i>Halcyon</i> 291	26.4	15.5	13.3	8.2	12.0	5.0	13.7	14.5	23.6		85.9		68.3	51.0	109.0	65.7	34.8		61.5
1229	21.8	12.0	10.8	6.5	8.7	3.8	10.3	12.3	19.0		90.1		74.7	77.3	111.4	63.2	34.2		64.7
<i>Ceryle</i> 729	23.8	13.5	11.5	6.9	10.0	5.0	12.8	11.8	19.8		85.3		64.0	53.8	102.5	68.3	34.8		59.6
<i>Parabuteo</i> 245	15.8	9.2	7.8	4.6	7.0	3.2	8.7	8.2	13.3		84.3		65.7	55.1	105.0	69.2	34.6		61.6

$$2419.4 + 17.3 = X \quad 17.3$$

type	br tarsus excl. hallux tip (a)	br mid tooth (b)	br tooth depth 4 (c)	br tooth depth 2 (d)	br hallux max e	br hallux mid 9 sh 6	br phal 1 digit 2 avg 9	br phal 2 digit 2 h	br mid phal 1 digit 3 avg mid 1	br phal 1 digit 4 P. 04 j	br	br	br	br	br
mit Canyon + thurs B. borealis	15.3	5.0	3.8 10.8	5.6 10.4	3.1 12.7	7.6	8.5 12.3	7.0	5.0 19.4	4.8 11.7	32.8	68.6	70.7	127	76.6
723	12.4	4.1	7.7	8.1							33.0	65.3			
1015	13.0	4.3	8.1	8.7							33.0				
829	13.5	4.6	8.6	9.0							34.0				
947	12.4	3.9	7.5	8.1											
331	12.4	4.1	7.8	8.0											
534	12.4	4.2	7.5	8.0											
837	13.9	4.7	8.3	9.0											
423	13.0	4.7	7.8	8.8									60.0		
B. regalis 1089	12.4	4.2	7.4	8.2							34.8				
978	12.2	4.1	7.5	8.2							33.6				
839	15.0	4.6	8.6	10.0	11.8	6.1	8.0 11.9	5.5	4.4 15.9	4.1 10.6	30.6			115	
1091	15.3	5.0	3.0 9.0	4.6 10.3	11.9	6.2	8.1 11.9	5.9	4.5 17.3	4.1 10.5	32.8			113	68.6
977	12.4	4.1	7.5	8.4							33.0				
Arg. chiripachos 1073	23.1	7.7	15.2	15.0	—	—	13.0 16.9	8.5	6.1 28.6	4.4 14.4	33.2	65.0		123	62.5
929	19.8	6.5	12.6	13.1							32.8	66.3			
468	21.4	7.8	15.5	15.1	19.1	8.9	12.7 18.0	8.2	6.0 27.0	15.2	36.4		69.3	124	74.5
1088	22.3	7.6	15.0	15.0							34.1		67.3		
969	19.4	7.9	4.6 13.5	6.1 12.9	16.1	6.8	11.0 14.5	6.4	4.9 25.5	14.3	40.5		68.0	131	73.6
241	19.8	7.3	12.8	13.4	17.0	7.7	12.1 16.4	7.1	5.5 26.3	14.0	36.8		64.7	132	
827					16.6	7.0	11.3 15.2	6.7	5.0 26.1	14.2					

br	tarsus	length	br.	Digit 1		Digit 2		Digit 2		Digit 3		Digit 3		Digit 4		Digit 4		Digit 4		Digit 4	
				Ph 1	Ph 1	Ph 1	Ph 2	Ph 2	Ph 1	Ph 2	Ph 1	Ph 2	Ph 3	Ph 4	Ph 4	Ph 4	Ph 4	Ph 4	Ph 4	Ph 4	
				Digit 1	Digit 2	Digit 2	Digit 3	Digit 3	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	Digit 4	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
length	br.	length	br.	length	br.	length	br.	length	br.	length	br.	length	br.	length	br.	length	br.	length	br.	length	br.
juv. canyon	16.0	—	11.1	(30.7)	13.0	11.2	11.9	(25.5)	9.1	19.4	9.3	10.9	7.3	11.9	5.4	6.0	6.0	6.3	5.6	—	4.7
Aquila 827	19.3	24.5	12.8	33.2?	7.5	6.2	7.4	31.2?	7.1	19.4	5.1	10.9	7.3	11.9	5.4	6.0	6.0	6.3	5.6	—	4.3
					6.8	12.9	13.5		10.5		9.4										
					7.3	8.3	7.2	32.4	7.0	25.6	5.1	12.8	6.1	14.5	5.1	7.3	6.4	6.8	6.6	—	
Circus 994	9.2		5.4	16.4	6.6	6.1	5.9	16.1	4.3	15.0	4.6	7.6	2.6	7.6	2.8	4.6	3.3	4.5	2.9	11.9	2.8
					3.3	5.0	3.5		3.2		2.5										2.4
B. 889	15.2	18.3	9.5	23.5	12.1	9.4	11.1	20.7	8.1	15.9	8.0	9.4	5.2	11.0	5.0	5.4	5.1	4.9	4.7	4.5	4.7
1091	15.3	—		24.1	6.3	7.0	5.5		5.5		4.7										3.8
307					12.1	9.8	11.2		8.3		8.2										5.1
Pandion 245	13.1		8.2	19.3	6.4	7.0	5.7	21.9	6.1	17.4	4.6	9.6	5.3	10.8	4.9	5.5	5.2	4.6	4.7	14.5	3.9
					10.0		6.7		6.5												
					5.6	11	5.0	16.6	3.8	13.2											
					10.3	9.1	9.5		6.7		6.8										6.3
					4.9	6.7	5.3	22.9	4.8	20.2	3.8	11.3	4.0	12.0	3.7	5.4	5.0	4.9	4.5	6.1	3.3
Paleo. 829				32.3	11.3					23.7				19.8							
B. borealis	17.3	9.6	24.9	10.3	6.2	9.5	9.5	23.0	7.4	18.2	7.2	10.2	5.0	10.9	4.5	5.6	5.2	5.2	4.6		
					6.1	6.5	5.3		5.5		4.3										
Alcedo				35.7	14.6			33.2	11.5	29.4	11.4			15.0	7.5						
					8.9				8.4		6.7										
Ac. cooperi				17.8	6.7			17.0	4.6	16.2	4.7			8.8	2.3						
					3.4	high			3.3		2.3										

					1	2	3											
	Ratio br. DIP to br dist	Ratio br. M1 to br dist	Ratio br. DIP to br dist	br dist	depth tooth 1	br tooth 1	br tooth 1	br tooth 2	br tooth 2	Depth tooth 3	br tooth 3	br tooth 3	br tooth 3	br to depth tooth 2	br tooth 2 to br dist	br to depth 2 to depth 1		
Mint Canyon fossil	81.3	69.0		17.5	10.5	5.7	10.1	4.8	8.2	10.7	4.8	4.6	7.9	58.6	27.4	45.7	96.3	
Ag. 827	87.3	66.3		21.0	13.5	5.8	11.2	6.5	10.8	13.2	4.8	10.7	60.3	30.9	47.7	-		
Qu. 994	71.7	58.1																
Baker reservoir 39	74.6	62.5		18.1	10.2			4.8	7.0	8.8				48.6	26.4%	47.1		
1091	78.			17.0	10.7	5.2	8.7	5.0	7.6	9.1	3.4	7.2	65.8	29.4	46.7			
Parabuteo	77.6	62.5																
Spizella 16872		71.7		18.5	11.4	4.3	9.4	6.1	9.1	10.5	3.9	6.0	8.2	67.1%	33.0%	53.5		
Spizella 16929		69.9		18.2	11.6	4.5	9.9	5.9	8.4	10.3	3.5	5.1	7.7	70.3	32.4%	50.8		
Amphispiza cathartica (Illus)				14.5	8.0			4.0	5.4					74.1	27.6%	50.0%		
B. (Illus)				20.9	13.1			7.2	10.2					70.6	30.4	55.0	- larger than any.	
B. (Illus)				22.5	13.2		11.4	7.0	10.0					68.6	31.0	53.0	86.4	
B. borealis				15.0	8.7			4.3	6.5					66.6	28.7	49.3		
Spilonia				13.3	7.7	3.2	6.3	5.2	5.8	7.5	3.0	4.5	4.7	89.3	39.1	46.4		
Paleoplamus				18.4	9.7	7.0	9.9	6.3	7.3	-				72.6	28.8	54.6		
B. typhius				16.8				5.5	7.8	10.3				70.5	32.7%			
Astur					8.0					7.7								
"					7.3					6.9								
Ac. corp					6.1					5.8								
U. troglodytes				18.7				5.6	7.7					72.7	29.9%			



Ratio of breadth to length

FOSSIL HAWKS

OLIGOCENE

- Buteo antecursor* Wetmore - Up. Oligo, Wyo., tarsometatarsus (in Mint Canyon bone excav. of inner trochlea goes higher -- well above troch.)
Buteo grangeri Wetmore, Olig. So. Dakota, skull similar to *B. borealis* but larger.
Paleoplancus sternbergi Wetmore, Olig. Wyo., skeleton (see paper)

MIOCENE

- Palaeoborus umbrosus* (Cope) Miocene? New Mexico, several
Palaeoborus howardae Wetmore, Miocene, Nebraska, tarsometatarsus (larger middle trochlea, shorter external troch. than Mint Canyon bone; breadth distal end 20.4 mm, least br. sh. 9.7 mm)
Palaeoborus rosatus A. Miller, Miocene So. Dakota, ulna
Buteo typhoius Wetmore, Miocene Nebraska, tarsometatarsus (int. troch. missing); breadth of shaft at level lower margin inferior foramen 14.0 mm., least breadth shaft 9.2 mm, ant-post. diameter outer trochlea 10.2 mm.
Buteo ales Wetmore Miocene Nebraska, tarsometatarsus (upper edge of alar portion of internal trochlea about on line with upper end of 1st intertrochlear sulcus -- considerably above this in Mint Canyon fossil) Length 90.2 mm, breadth prox. 15 mm., br. dist. 16.2 mm, least br. sh. 7.6 mm); mid troch. too large for Mint Can. bone
Buteo contortus Wetmore Up. Miocene Nebraska, tarsometatarsus (very large middle trochlea. Length 113.0 mm., greatest breadth prox. end 19.0 mm, gr. br. dist. end across trochleae 23.0 mm, least breadth shaft, 10.0 mm.). Too large for Mint Canyon specimen, middle trochlea too massive, ext. trochlea short.
Buteo dananus (Marsh) Miocene, Nebraska - tibiotarsus. Larger than *B. ales*, See Wetmore 1923 compared with *B. contortus*. Br. dist. end 16.9 mm. (smaller than *Geranoaetus melanoleucus*)
Urubitinga enecta Wetmore Miocene (Mid.) Nebraska, tibiotarsus and femur. Presumably a slender, light weight form, breadth similar to Mint Canyon tarsometatarsus but apparently longer boned. ~~Referred tarsometatarsus? has narrow base of 1st trochlea, whereas Mint Can. bone is heavy here.~~
Proictinia effera Wetmore Miocene, Nebraska, tarsometatarsus -- tiny.

PLIOCENE

- Buteo conterminus* Wetmore Low. Plio., Nebraska, tarsometatarsus. Excav. of inner trochlea goes high (OK for Mint Canyon), but bone too large and external trochlea short. Greatest breadth dist. 22.5 mm., least br. shaft 11.0 mm.
Neophrontops dakotensis Compton, Pliocene So. Dakota, dist. end humerus
Proictinia gilmorei Shufeldt, Low. Pliocene, Kansas, coracoid tiny

PLEISTOCENE

- Neogyps errans* Miller, Rancho La Brea -- all elements
Neophrontops americanus Miller, Rancho La Brea -- all elements
Urubitinga fragilis Miller, Rancho La Brea, all elements
Urubitinga milleri Howard, Hawver Cave, coracoid
Wetmoregyps daggetti Miller, Rancho La Brea, tarsometatarsus Type.
Morphnus woodwardi Miller, Rancho La Brea, all elements
Spizaetus grinnelli, Rancho La Brea all elements
Aquila pliochryps, Fossil Lake, hallux, too long and slender for M. Can.
Aquila sodalis, Pleistocene, pros. end tarsometatarsus, br. 17.6 mm.
Spizaetus willetti Howard, Smith Creek Cave, Nevada, tarsometatarsus, very large
Calochierax quadratus, Quaternary Bahama Islands, tarsometatarsus. Alar portion of 1st trochlea reduced so troch. appears square and blocklike. Middle trochlea smaller than in *B. borealis*. Height of alar part less than in Mint Canyon bone

PLEISTOCENE continued

Titanohierax gloveralleni, Quaternary, Baham Island. Very large,
middle trochlea big and prominent

Size apparently OK for Mint
Canyon specimen

Buteo ales
Buteo antecursor
Urubitinga fragilis
Smallest *Spizaetus grinnelli*

Size too large for Mint
Canyon specimen

Buteo grangeri? (skull only avail)
Buteo typhoius
Buteo conterminus
Buteo contortus
Buteo dandnus? (tibia only)
Urubitinga enecta? (no tarsus)
Neogyps errans

Characters of subfamilies

AQUILINAE - distal end tarsometatarsus, trochlea 1, facet extends up
as far as (or farther) than level of proximal extent of
middle trochlea and trochlea 3 about the same.

HALIAETIDINAE -- dist. end tarsometatarsus, facet of 1st trochlea ends
below level of proximal extent of middle trochlea; facet
of third trochlea a wee bit higher and pretty well indented
above it.

BUTEONINAE -- distal end tarsometatarsus, about the same in trochleae as
the above but less indentation over third trochlea.

1754 Amer. Mus.

Other species named from Farsi

Buteo zylphicus - distal end with int. troch. gone
up. Mio. Snake Creek Beds, 23 miles so. of Ogata, Neb.
coll. 1916, described 1923, Bull. Amer. Mus. Nat. Hist.
vol. 48 pp. 489-492, figs. 3 & 4.

Meas. Least breadth of shaft 9.2 mm.

Br. of shaft at level of lower

margin of inferior foramen 14.0 mm.

Greatest width external face 11.7 "

Antero-post. diam. of intertub. 10.2 "

Have cast of type

1758 Dept. Vert. Pal. Amer. Mus. Nat. Hist.

Zenaidura macroura - complete left tarsus -

Upper Mio. Snake Creek Beds near Sinclair Draw,
Strom Co., Nebraska, near Ogata, coll. 1916. Described 1923 - Bull.
Amer. Mus. Nat. Hist. Vol. 48 pp. 492-497.

figs. 6-9.

Measurements: Length 113.0, gr. br. head 19.0 mm.
gr. br. distal end across trochlea 23.0. Least br. th. 10.0
distance from center of tib. ant. tub. to upper end of
shaft, 21.0 mm.

Note: very large middle trochlea

Urubitinga euereta #6300 Amer. Mus. left tibioxarnis. Lower
Snake Creek - early mid Mio., So. of Ogata, Nebraska

Measurements: Length 163.0 mm ap. br. condyles 17.0 mm.

Presumably a slender light weight Eagle (or hawk)
of a ~~small~~ ^{breadth} similar to the Mint Canyon bird but longer boned
The available bones related to U. euereta have the narrow
base to the 1st troch. whereas the Mint Canyon bird is heavier here.

12156 Princeton Univ. Geol. Mus.

Geranoaetus conferrimus, distal end tarsus.

Lower Pleistocene - Snake Creek - 20 mi so. Ogata, Neb.
coll. 1914. Described 1923, Bull. Amer. Mus. Nat.

Hist., vol. 48 pp 497-499 figs 11-13.

Measurements - greatest br. across trochlea 22.5 mm.
least br. sh. 11.0

✓ Outer trochlea - articular portion narrow, laterally
compressed

Geranoaetus

~~Agilis~~ Janaeus - tibial tarsus. Alto? Long Fork Neb.
Amer. Jour. Sci. Arts. (3) II p. 125 1871.

For fig. see Shufeldt Trans. Conn. Acad. Sci.
vol. 19 pl. II fig. 13.

Pr. of distal end ~~approx.~~ 16.7 mm; smaller than
Geranoaetus melanoleucus. Not far off in size
from The Mint Canyon specimen.

Geranoaetus alus - complete right tarsus. Miocene
Low. Harrison Beds, Ogata Springs Fossil Quarries, Neb.
coll'd 1906. Described 1926. Annals Amer. Mus. vol. 16

pp 403-408, pl. 38 (with 5 figs.)

Measurements - length 90.2 mm. br. prox. 15, br. ~~dist.~~ 16.2 mm.
least br. sh. 7.6. Dist. from tub. to upper end of sh. 14.9.

Upper edge of alar portion of int. troch. about on a line with the
upper end of the first intertrochlear sulcus (considerably above this in ~~fig. 100~~ 100)

① *Calochus quadratus*
 alar part of 1st tooth reduced so that tooth appears
 square & block-like. Middle tooth, smaller than in *B. brevis*
 Note: note that height of alar part is less than in Mint Canyon
 bone.

Calochus glenalei - much too large. Mid tooth big &
 prominent

Zeuglodus contortus - too narrow, alar part of 1st tooth ^{& not high enough}
 Too high mid tooth.

Z. confertus - has broader base of 1st tooth than *contortus*
 & is thus more like *Mint Canyon*
 middle tooth 7.0 mm ^(37.4% of br. mensural axis) whole spec. considerably
 larger than mint C. spec.
 1st tooth 12.5 deep br. across tooth 22.5 (the 6.18.7
 excluding alar part)

Orbitiger aucta type tibia larger than ridge way.
 br. distal 17.5

Antes garyi (Oleg) - a skull smaller than
glenalei but larger than *brevis*

Bates aucta - groove leading to foramen shallow
 but sharply marked - continues below foramen

Note: In Mint Canyon bone, groove very deep above foramen,
 none below.
 mid tooth broad & strong. More curves to sub. tooth than
 in mint canyon & alar lower.

Bates ales - alar part of tooth is low. whole tooth has
 curves. Not blocked as in *Mint Canyon* ext. tooth
 less extensive than Mint C. - stubby

22
 30
 53
 77

19.4

17.9

1358

1358

194

73) 3433.8(20

346

In Circus D_1P_1 & D_2P_2 are about same length, ^{& size, except} the latter less flared at prox. end.

In Buteo ^{agilis} D_2P_2 is ^{considerably} shorter than D_1P_1 (~~most in Aquila~~) & the former is more slender throughout ~~the~~ ^{the}

In Aquila D_2P_2 is considerably shorter than D_1P_1 . The prox. end of the ~~former~~ ^{latter} is less flared

same for Haliaeetus except two bones are nearer of a single length

In Circus ^{& Acc. corp} D_2P_2 is less flared than in others

In Circus ^{& Acc. corp} D_3P_3 is long & slender (more than 90% of length of D_1P_1)

In Ag. & Buteo D_3P_3 is shorter ^{rel.} broader

In Hal. D_4P_4 is very flared in mid. region

In Aquila & Buteo D_4P_4 with slight indentation at shaft

In Acc. D_4P_4 is slender & shaft prominent

The fossil is certainly Buteonine & closer to Buteo than to Aquila & Spizaeetus.

Palaeobons Howardae Tamm # 13897 USNM.

Miocene Dawson Co., Neb. Colled 1934. Described 1936
Proc. USNM. vol 84 pp 73-75.

Meas. ~~ant br~~ br. th. 9.7 - br dist 20.4 mm.

longer mid tooth shorter ext. than Mst Canyon bone

Buteo antecursor - left tarsus # 2233 Mus. Comp. Zool.
Upper Olip, near Torrington, Wyo. Coll'd 1930 figs 1-5
Described 1933. Bull. Mus. Comp. Zool. vol. 75 pp. 298-301
Measurements - length 90.8, gr b. head 16.7, b. dist 18.1
least br sh 7.8.

Mid tarsus bigger & 1st toe not so large at its base

Titanohueiax generalis - # 2257 Mus. Comp. Zool.
Tarsus - dist. half broken rock! - cave of Great Exuma Is. 1937
Described 1937 - Bull. Mus. Comp. Zool. vol. 80 pp. 430-434.
Pre Columbian age (2000 or more yrs?) figs 4-7 & plate
Meas. least br sh 13.0; br. at base of tarsus 28.5
Very large (even heavier than *naples woodwardi*?)

Calohueiax quadratus - Tarsus broken # 2256 Mus. C. Zool.
coll'd 1937 - sp. cit above pp 429-430 figs. 1-3
Meas. least br sh - 5.8 - br. mid tarsus 3.5, outer toe 4.7
About size of Red-shouldered hawk - too small for
B. regalis or borealis.

Buteo grayeri - Skull # 14405 - Mus. Paleont. Univ. Mich.
Big Bad Lands of Pass Creek, Washakie Co. Wyo., S. Dak.
1932 Described 1934, ~~Cont.~~ Mus. Paleont. Univ. Mich.
pp 129-132, 1 pl (with 3 figs)
Meas. Dist. with frontal 19.3
Dist. without 21.0
Depth of mandible
Length to cranio-facial angle 54.0
Size larger than B. borealis smaller than *undulatus*

Digit 2, Ph. 1 - Broad & deeply creviced at articulation
unlike any others in before of this series

Digit 1, Ph. 1 - A broad shaft - closest to P. 1, rather
flaring and more ~~than~~ than P. 1.

Digit 2 Ph. 2 - about same in all the more slender in Circum

